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A PROTOTYPE FUEL-BREAK IN THE EASTSIDE PONDEROSA-JEFFREY PINE TYPE

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ABSTRACT: An average sawtimber stand having a dense understory was converted to one type of fuel-break for $132.00 an acre. Qualified observers believe this barrier would either stop or help in controlling a rolling fire under severe burning conditions.

Introduction

Massive fires, or conflagrations, can destroy the results of years of forest growth and management in a few hours. The lost resources, needed by a growing population, cannot be quickly replaced. Forestry researchers are therefore striving to find effective means to combat wildland conflagrations.

One of the means that has been developed and put into practice is the fuel-break. It is a wide, strategically located block or strip of land on which heavy native cover has been converted to lighter vegetation. Such a break reduces the fuel available to an advancing fire and gives suppression forces access and room to fight the fire.

Most fuel-breaks have been constructed in brush and woodland areas. But research is underway to determine whether the concept can be applied to timber lands as well. Methods and costs of construction and the effectiveness of fuel-breaks in timber are being studied. This note reports the results of one of these exploratory studies, the construction of a prototype fuel-break in the Blacks Mountain Experimental Forest, near Susanville, California.

Site

The site borders a road for some 31 chains and is 4 to 5 chains wide--an area of about 14 acres. Before logging, it contained an overmature pine stand with a generally dense understory of saplings, principally pines. An unusually large number of fallen snags and old windfalls lay on the ground. Individual bushes and small groups of greenleaf manzanita were distributed throughout the area. Squaw carpet was present, usually on rocky ground. There were also scattered grasses and miscellaneous forbs.

Procedure

The fuel-break was made in conjunction with a normal logging operation. Combining the two operations, of course, reduces the amount of clearing that must be done for fuel-break purposes alone.

The logging crew was directed to take special care to protect saplings when skidding the felled trees. In general, a well spaced and pruned stand of saplings was left so that the area would not be removed from timber production entirely.

Some 270 trees were felled. Mean volume per acre removed was about 18 M bd. ft. About 18 tons per acre of slash were laid down during harvesting.[1/]

Clearing after logging included not only the slash from logging but also snags, windfalls, miscellaneous smaller dead fuels, and young, green trees removed to give desired spacing in the remaining stand. The work plan for clearing included the following instructions:

1. "Leave" trees:
   a. Favor pine wherever possible;
   b. All "leave" trees should be free of mistletoe, relatively straight, relatively free of logging damage;
   c. Spacing:
      (1) Trees 0 to 4 inches d.b.h.--12 feet minimum;
      (2) Trees 5 inches or larger d.b.h.--20 feet minimum;
   d. Pruning limits to be determined in the field--leave half the live crown;
2. Slash disposal:
   a. Move bulk of snags and windfalls into compact piles with stems parallel; keep piles within moderate size and in openings already created by logging, if possible, to minimize fire damage to the residual stand; buck and use

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1/ Computed from Chandler's slash tables (Chandler, C. C., Slash weight tables for westside mixed conifers. U.S. Forest Serv. Pacific SW. Forest & Range Expt. Sta. Tech. Paper 48, 21 pp. 1960.) by assuming an average 60 percent crown on the trees felled.

choker on large pieces; if soft pieces must be moved by dozer blade, first select "leave" trees in the vicinity before dozing; cut tops and large limbs on down trees, where necessary, to reduce damage to "leave" trees;

b. Thin the residual stand to prescribed spacing, using powersaws, bulldozer, and hand tools so that maximum efficiency is obtained from men and equipment;

3. Remove brush;
4. Burn piles of debris when burning conditions permit.

Pictorial Review

The following pictures show the type of timber stand that covered the area, the slash and other debris on the ground after logging, and the completed fuel-break.

Costs

Table 1 presents the time and basic cost involved in the creation of the fuel-break, after the logging had been completed. Hourly labor costs have been multiplied by a factor of 1.2 to make allowance for leave benefits and general administrative costs. Transportation to and from the job is not included. It should be remembered that this effort was a first trial, that the same crew could probably do the same job at lower cost in a subsequent trial, and that the crew involved consisted of key men at relatively high wage rates.

Table 1.--Labor and equipment input for fuel-break project, Blacks Mountain Experimental Forest

No. of men	Rate	Hours	Cost	Per acre Hours	Per acre Cost
LABOR					
1	$3.09	18	$ 55.62	--	--
1	2.81	95	266.95	--	--
2	2.71	190	514.90	--	--
1	3.17	72	228.24	--	--
1	3.61	2	7.22	--	--
Total	--	--	1,072.93	--	--
Overhead factor	--	--	x 1.2	--	--
Total labor		377	1,287.52	27.1	$92.63
EQUIPMENT					
TD-18 bulldozer	9.50	54	513.00	3.9	36.91
5hp & 7 hp chainsaws	.50	87.5	43.75	6.3	3.15
Total			556.75		40.06
Total cost per acre					132.69

Figure 1.--Timber stand adjacent to treated area.

Figure 2.--Fuel-break area compared with adjacent stand.

Figure 3.--Photo point number 1, after logging.

Figure 4.--Photo point number 1, after treatment.

Figure 5.--Photo point number 2, after logging.

Figure 6.--Photo point number 2, after treatment.

Figure 7.--Photo point number 3, after logging.

Figure 8.--Photo point number 3, after treatment.

Figure 9.--Spacing and pruning of group of poles after treatment.

The total cost of $132.69 per acre includes the normal cost of slash disposal work after logging, which would be about $7.56 per acre. Therefore, the additional, or real, cost of making the fuel-break is $125.13 per acre.

Remarks and Observations

The effectiveness of this type of fuel-break in timber remains to be seen. One of the most important specifications to be developed is the width of the fuel-break for given conditions of vegetation, terrain, and climates. According to the judgment of fire control specialists, however, the strip treatment described here appears to be adequate to stop a rolling fire under severe burning conditions. Of course, its effectiveness will depend in part on the way it is used by fire control crews. The fuel-break cannot prevent spot fires from being started well ahead of the fire; quick action is needed from fire crews to keep them under control.

The fuel-break will require maintenance. Regrowth of brush, grass, and forbs will probably have to be removed by chemical spraying or prescribed burning every two or three years. Periodic thinning of young trees left on the area will be necessary if crown closure occurs. Because of the wide spacing of these trees, thinning should not be necessary until they are of

marketable size. It is expected that natural regeneration and thinning will insure the continuance of a widely spaced stand on the break.

There is much yet to be learned about making fuel-breaks in timber. This project has contributed useful information on the problems, methods, and costs involved.